

# Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

---

Vol. 9.

February, 1907.

No. 98

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## NOTES ON MUHLENBERGIA.

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A critical study of eastern species of *Muhlenbergia* as represented by the material in the National Herbarium, has led to a somewhat new classification of the species heretofore recognized and the segregation of several subspecies and one new species. The results of this study are here presented.

SECTION 1. Glumes minute, the first sometimes obsolete. *Muhlenbergia* proper.

1. MUHLENBERGIA SCHREBERI Gmel. Syst. Nat. 2:171. 1791.  
*M. diffusa* Willd. Enum. 1:81. 1809; Schreb. Gram. 2:143.  
Pl. 51. 1810.
- 1a. MUHLENBERGIA SCHREBERI **curtisetosa** Scribn. n. subsp.  
Panicles 3–12 cm. long; spikelets 2.5–3 mm. long; glumes unequal, the first ovate, obtuse, about 1 mm. long, the second ovate or ovate-lanceolate, obtuse, acute or abruptly mucronate-pointed, 1–2 mm. long; lemmas short-awned; awns 1 mm. or less in length. Type collected by J. Wolf in Illinois in 1881. Other specimens in the Natl. Herb.; Illinois, *J. Wolf*, 1882, Champaign, Illinois, *G. P. Clinton*, 1892. No. 204 *A. Commons* from Centerville, Delaware, apparently belongs here.
- 1b. MUHLENBERGIA SCHREBERI **palustris** Scribn. n. comb. *Muhlenbergia palustris* Scribn. U. S. Dept. Agric. Div. Agros. Bul. 11: 47. 1898. Culms filiform; sheaths naked at the throat; both glumes manifest; awns 5–6 mm. long. Swamps, Brightwood, District of Columbia (Type locality).

SECTION 2. Glumes ovate, acute, much shorter than the lemmas. (*Stenocladium* Trin. Fund. Agros. 117, as a section of *Trichochloa*.)

2. MUHLENBERGIA SOBOLIFERA (Muhl.) Trin. Gram. Unifl. 189.

Pl. 5, fig. 4. 1824. *Agrostis sobolifera* Muhl. in Willd. Enum. 95. 1809. *Trichochloa sobolifera* Trin. l. c.

- 2a. MUHLENBERGIA SOBOLIFERA **setigera** Scribn. n. subsp. Culms very slender, much branched; lemmas awned; awns 1–3 mm. long. Otherwise as in the species. Type, no. 70 *J. Reverchon*, Texas, in Natl. Herb. No. 1054 *J. Reverchon* in Natl. Herb., also from Texas, belongs here.
3. MUHLENBERGIA TENUIFLORA (Willd.) B. S. P. Prelim. Cat. Pl. N. Y. 67. 1888. *Agrostis tenuiflora* Willd. Sp. Pl. 1:364. 1797. *Muhlenbergia Willdenowii* Trin. Gram. Unifl. 188. 1824. *Trichochloa longiseta* Trin. Fund. Agros. 117. 1820.
- 3a. MUHLENBERGIA TENUIFLORA **variabilis** Scribn. n. subsp. Culms smooth at the nodes, much branched above; panicles linear, strict, erect, more rigid than in the species; spikelets 4 mm. long; lemmas mucronate or short-awned; awns 2–3 mm. long. Type, no. 654a *Biltmore Herbarium* from Chimney Mountain, Rutherford, North Carolina, distributed as *Muhlenbergia sobolifera*.

SECTION 3. Glumes narrow, acuminate or aristate, nearly as long as or exceeding the lemmas in length. (*Acroxis* Trin. Fund. Agros. 117, as a section of *Trichochloa*.)

4. MUHLENBERGIA MEXICANA (Linn.) Trin. Gram. Unifl. 189. 1824. *Agrostis mexicana* Linn. Mant. 1:31. 1767. *Trichochloa mexicana* Trin. Fund. Agros. 117. 1820. *Muhlenbergia polystachya* Mac. & Bush. Trans. Acad. Sci. St. Louis, 12:79. Pl. 12. 1902. *Agrostis lateriflora* Michx. Flor. Bor. Am. 1:53. 1803. Culms diffusely branched throughout from the base; panicles numerous, 3–10 (usually about 6) cm. long, oblong-ovoid or subpyramidal, rarely linear, the base usually enclosed within the subtending leaf-sheath.
- 4a. MUHLENBERGIA MEXICANA **commutata** Scribn. n. subsp. Lemmas awned; awns 4–10 mm. long. Otherwise as in the species. (*M. sylvatica*, in part of authors.) Quite distinct from *Agrostis sylvatica* Torr. upon which *Muhlenbergia sylvatica* was based. Specimens in Natl. Herb.: no. 171 *M. L. Fernald*, 1893 and nos. 528, 1894 and 522, 1896, all from Maine; no. 80 *Wm. Harriot*, 1901, from Ontario and no. 26,245 *J. Macoun*, 1901, from the same region. Other specimens from New York, Delaware, Pennsylvania, Illinois and Minnesota. The specimens from Delaware (no. 206 *A. Commons*) have aristate glumes

equalling or slightly exceeding the florets and awns of the latter 6–10 mm. long. An exact counterpart of this form, but awnless and placed under the species, was collected by C. R. Ball at Athens, Illinois, in 1892. The specimens from Pennsylvania (coll. by T. C. Porter, 1895), with rather loose subpyramidal panicles are exactly represented by awnless specimens collected in Illinois by J. Wolf in 1892. The latter are referred to the species.

5. MUHLENBERGIA FOLIOSA Trin. Gram. Unifl. 190. 1824. *Trichochloa foliosa* Trin. Fund. Agros. 117. 1820. *Agrostis foliosa* R. & S. Syst. 2:373. 1817. *Agrostis filiformis* Willd. Enum. Hort. Berol. 1:95. 1809, not Sprengel 1807. *Agrostis filiformis* Muhl.! Gram. 66. 1817. *A. lateriflora filiformis* Torr. Fl. 1:66. 1824. *Muhlenbergia mexicana filiformis* Scribn. Mem. Torr. Bot. Club. 5:36. 1894. *Muhlenbergia mexicana* of authors in part. Culms branched above rarely to the base, branches elongated; panicles 5–15 cm. long, narrowly lanceolate to filiform, long-exserted, densely flowered, more or less interrupted especially towards the base.

The type of Muhlenberg's *Agrostis filiformis* is in his herbarium, deposited in the Academy of Natural Sciences of Philadelphia, and is the species here referred to *Muhlenbergia foliosa* Trin. assuming that it is identical with the *Agrostis filiformis* of Willdenow upon which *M. foliosa* was founded. Both Willdenow and Muhlenberg note the close affinity of this species with *M. mexicana* and Trinius in his later writings (Trans. St. Petersburg Acad. VI, 6<sup>2</sup>:278. 1841) refers *M. foliosa* to that species. The habit of the plant and especially the fewer much exserted and more elongated panicles and more densely flowered panicle-branches serve to distinguish the species as here classified. *Agrostis frondosa* Poir. Encycl. Suppl. 1:252. 1810, was considered by Roemer & Schultes as identical with *Agrostis filiformis* Willd. The identity of Poiret's species is now doubtful; he says of it that it grows in Germany and resembles *Agrostis mexicana* Linn. in its inflorescence.

Among the specimens in the National Herbarium referred to *Muhlenbergia foliosa* are the following: nos. 524, 526 and 529 *M. L. Fernald*, from Maine, no. 68 *H. B. Dorner* from Indiana; no. 794 *E. A. Mearns* from Minnesota; nos. 1686, 1756, 1764, 1704, and 2848 *P. A. Rydberg* from Nebraska; no. 521 *David Griffiths* from

Wyoming; no. 359 *O. B. Metcalfe* from New Mexico; nos. 26,248, 26,247 and 26,246 *J. Macoun* from Ontario.

- 5a. **MUHLENBERGIA FOLIOSA *ambigua*** Scribn. n. comb. *Muhlenbergia ambigua* Torr. in Nicollet's Rept. 164(237). 1843. *M. sylvatica* Auct. in part. Lemmas awned; awns 4–10 mm. long. Otherwise as in the species.

A specimen of the type collection of *Muhlenbergia ambigua* is in the National Herbarium. Other specimens referred here are no. 26,244 *J. Macoun*; no. 80 *Wm. Harriot*; no. 525 *M. L. Fernald*, 1893; no. 527 *M. L. Fernald*, 1894. A specimen from Delaware, collected by A. Commons in 1897, has panicles rather more closely flowered and more rigid than usual. An awnless counterpart of this form was collected by C. R. Ball in Ohio in 1892. The presence of a more or less developed second floret noted in the original diagnosis of *M. ambigua*, occurs in other species of this group.

- 5b. **MUHLENBERGIA FOLIOSA *setiglumis*** Scribn. n. comb. *M. sylvatica setiglumis* S. Wats. U. S. Geol. Expl. Exped. 40th Par. 5:378. 1871. "Glumes attenuate into a scabrous bristle 2½–3 lin. long; the palea with its awn about twice longer" (S. Wats. l. c.). The habit of this subspecies is entirely that of *Muhlenbergia foliosa* and the plant differs from *M. foliosa ambigua* only in the awn-like prolongation of the glumes beyond the floret as in *M. racemosa*. A specimen from the type collection is in the National Herbarium, no. 1,288 *S. Watson*, from near Warm Springs, Humboldt Pass, Nevada. To this subspecies are referred no. 2,838 *T. A. Williams* from Wyoming; no. 3 *Williams* from South Dakota; no. 927 *Griffiths & Morris* from Oregon and no. 2 *F. P. Briggs* from Bradley, Maine. In Briggs' specimen the glumes equal or much exceed the florets in different spikelets in the same panicle.

6. ***Muhlenbergia umbrosa*** Scribn. n. nom. *Agrostis sylvatica* Torr. Fl. U. S. 1:87. 1824, not Linn. 1762. *Agrostis diffusa* Muhl. Gram. 64. 1817, not Host 1809. *Muhlenbergia sylvatica gracilis* Scribn. Trans. Kans. Acad. Sci. 9:116. 1885, not *M. gracilis* Kunth 1829.

*Muhlenbergia sylvatica* Torr. & Gray was based upon *Agrostis sylvatica* Torrey, who changed the name from *Agrostis diffusa* Muhl. because of an earlier *Agrostis diffusa* by Host, apparently overlooking the much earlier *Agrostis sylvatica* of Linnaeus. There being no

other name available for this very well defined species a new one, *M. umbrosa*, is here proposed.

Torrey thus describes the species closely following Muhlenberg in his diagnosis of *Agrostis diffusa* "Culms erect, much branched, diffuse, smooth; stipules lacerate panicle filiform; corolla longer than the calyx; awns three times as long as the flower." Torrey compares the species with *M. tenuiflora* from which he says it differs "in being much branched and diffuse, the glumes are also longer and narrower and the culms are glabrous at the nodes."

The type of this species is in Muhlenberg's herbarium in the Academy of Natural Sciences of Philadelphia. It has much branched culms with numerous filiform panicles and long-awned spikelets. No. 205 *A. Commons* from Delaware and no. 461 *B. Fink* from Iowa, both in the Natl. Herbarium are identical with the type. The general aspect of the species is unlike that of either *M. foliosa ambigua* or *M. mexicana commutata*, both of which have heretofore been referred to *M. sylvatica* by authors. The panicles are more slender, the spikelets are less crowded and are usually pale green or straw-colored, never violet or purplish as is usual in those subspecies.

6a. MUHLENBERGIA UMBROSA **attenuata** Scribn. n. subsp. Lemmas awnless or merely mucronate-pointed. Otherwise as in the species. Type, no. 25 *E. N. Wilcox* from Aurora Co., South Dakota. No. 27 *J. H. Kellogg* from Missouri; no. 8096 *E. S. Steele* from the District of Columbia; no. 523 *M. L. Fernald* from Maine, belong here. The subspecies ranges from Maine to Dakota and Nebraska southward to Missouri and Kansas.

A very careful study of the abundant material classified under *Muhlenbergia mexicana* and *M. sylvatica* in the National Herbarium, has led to the interesting conclusion that both these species present awned and awnless forms and that the true *M. sylvatica* should be limited to the *Agrostis diffusa* of Muhlenberg, a well marked species quite distinct from awned forms of *M. mexicana* or of the restored *M. foliosa* of Trinius. In the case of these latter species it was found that every slight variation in habit in plants with awnless spikelets could be exactly matched by awned specimens, the presence of the awn being the only difference whatever. The natural conclusion is that the awnless and awned plants belong to the same species and that at best the latter (those with awned spikelets) could only be treated as subspecies of the former. It appears also, that *Muhlen-*

*bergia Schreberi*, *M. tenuiflora* and *M. umbrosa*, all awned species, present forms in which the awns are very much reduced and that in the awnless *M. sobolifera* an awned form occurs. The importance of the awn as a character for diagnosis in this group of species has apparently been much overestimated.

7. **MUHLENBERGIA RACEMOSA** (Michx.) B. S. P. Prelim. Cat. Pl. N. Y. 67. 1888. *Agrostis racemosa* Michx. Fl. 1:53. 1803. *Agrostis setosa* Muhl. Gram. 68. 1817. *Trichochloa glomerata* Trin. Fund. Agros. 117. 1820. *Muhlenbergia glomerata* Trin. Gram. Unifl. 191. 1824. This well known species ranges from Newfoundland to Washington and British Columbia and southward in the east to North Carolina and in the west to Texas (?), New Mexico and Arizona.
- 7a. **MUHLENBERGIA RACEMOSA RAMOSA** (Vasey) Beal. Grasses N. Am. 2:253. 1896. *M. glomerata ramosa* Vasey Cat. Grasses U. S. 40. 1885. "A much branched spreading form, Illinois to Colorado and Montana" (Vasey l. c.). "Stout, much branched below, very leafy. Prairie regions." (Vasey Contrib. U. S. Natl. Herb. 3:68. 1892.) No. 397 *Griffiths* from South Dakota, no. 405 *B. F. Bush* from Missouri, no. 2853 *F. Clements* from Nebraska and no. 265 *B. B. Smyth* from Kansas belong here. This is the common form in the prairie regions of the west.
- 7b. **MUHLENBERGIA RACEMOSA violacea** Scribn. n. subsp. characterized by its slender simple culms usually violet or dark purple and more or less interrupted panicles, abruptly aristate glumes and comparatively small spikelets. Type from North Hannibal, New York, collected by *O. E. Pearce* 1883 without number. No. 748 *E. H. Mearns* from Minnesota belongs here. This subspecies is less well defined than the last. It is apparently common in the north growing usually in bogs.
8. **Muhlenbergia glabrifloris** Scribn. n. sp. A slender branching glabrous perennial 4-6 dm. high, from scaly rootstocks, with flat erect or ascending leaves, slender strict panicles and awnless spikelets 2.5-3 mm. long. Culms terete, very minutely scabrous for a short distance below the nodes, soboliferous at the base; sheaths somewhat compressed, smooth, mostly shorter than the internodes, crowded on the branches, naked at the throat; ligule very short, 1 mm. or less long, minutely ciliate on the edge; leaf-blades 2-10 cm. long, 1-4 mm. wide, acute, very minutely scabrous

along the margins and nerves; panicles simple, 2–6 cm. long, occasionally somewhat glomerate, the closely flowered short branches appressed, usually partly enclosed in the subtending leaf-sheath; pedicels scabrous, usually much shorter than the spikelets; spikelets ovate-lanceolate; glumes lanceolate, acute or acuminate-pointed, subequal, a little shorter than, as long as, or a little longer than the floret, scabrous on the keel excepting near the base; lemmas ovate or oblong, obtuse or submucronate-pointed, scabrous on the keel and lateral nerves above, otherwise smooth, no hairs at the base; palea ovate-oblong, obtuse, equalling or a little shorter than the lemmas.

Type, no. 5 *J. Reverchon*, from Texas in the National Herbarium. Other specimens are from Illinois, *J. Wolf* and *E. Hall*. Hall's specimen is presumably from Athens in 1868 and was first referred to *M. sylvatica* by Vasey, who later regarded it as a doubtful variety of *M. mexicana*. The culms are branching throughout and the numerous small panicles terminating the branches and partly included in the subtending leaf-sheaths present the habit of *M. mexicana*, but the plant is more slender throughout especially in its panicles, the texture of the glumes and lemmas is much softer and the latter are perfectly smooth at the base there being no hairs either upon the callus or on the body of the lemma. The spikelets are rather those of a *Sporobolus* than a *Muhlenbergia* but the plant evidently belongs with the soboliferous species of the latter.

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## THE ALPINE RHINANTHUS OF QUEBEC AND NEW HAMPSHIRE.

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THE plants which have long passed in eastern America as *Rhinanthus Crista-galli* L., in part (*R. minor* Ehrh.), occupy two strikingly different geographic areas. One, apparently the true *R. Crista-galli* (*R. minor*), abounds in sterile fields and meadows, and along road-